From: "John Kauffman" <John.Kauffman@dgif.virginia.gov>
To: <JXC9@nrc.gov>
Date: Mon, Aug 7, 2006 2:09 PM
Subject: Fwd: 05-079F_ESSLOG 19290_N. Anna ESP

I don't think a copy of this was mailed to you yet. it was sent to DEQ as part of the CZM review.

>>> Andrew Zadnik 07/07/06 04:04PM >>>
Attached is the letter I just sent to DEQ.

Thanks for your help.
Andy

>>> Andrew Zadnik 07/07/06 4:02 PM >>>
Attached are our comments. A hard copy is in the mail.

Thanks,
Andy

Andrew K. Zadnik
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Department of Game and Inland Fisheries
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Mail Envelope Properties (44D781C8.F81 : 16 : 44929)

Subject:	Fwd: 05-079F_ESSLOG 19290_N. Anna ESP
Creation Date	Mon, Aug 7, 2006 1:58 PM
From:	"John Kauffman" <John.Kauffman@dgif.virginia.gov>
Created By:	John.Kauffman@dgif.virginia.gov

Recipients
nrc.gov
OWGWPO03.HQGWDO01
JXC9 (Jack Cushing)

Post Office	**Route**
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MESSAGE	503	Monday, August 7, 2006 1:58 PM
19290_070706_LkAnnaESP.doc		100352
Mime.822	1	

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July 7, 2006

Mr. Charles H. Ellis, III
Department of Environmental Quality
629 East Main St., Sixth Floor
Richmond, VA 23219

RE: North Anna Early Site Permit
Coastal Consistency Determination
05-079F
ESSLOG 19290 (20374)

Dear. Mr. Ellis:

We have reviewed the subject Consistency Determination and offer the following comments and recommendations. The Department of Game and Inland Fisheries (DGIF), as the Commonwealth's wildlife and freshwater fish management agency, exercises enforcement and regulatory jurisdiction over those resources, inclusive of state or federally endangered or threatened species, but excluding listed insects. We are a consulting agency under the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), and we provide environmental analysis of projects or permit applications coordinated through the Virginia Department of Environmental Quality (DEQ), the Virginia Marine Resources Commission, the Virginia Department of Transportation, the U. S. Army Corps of Engineers, the Federal Energy Regulatory Commission, and other state or federal agencies. Our role in these procedures is to determine likely impacts upon fish and wildlife resources and habitats, and to recommend appropriate measures to avoid, reduce, or compensate for those impacts.

This project involves an application from Dominion Virginia Power Company (Dominion) for an Early Site Permit (ESP) for the North Anna Nuclear Power Plant, located on Lake Anna in Louisa County. The ESP would be for activities related to the addition of nuclear reactors Unit 3 and Unit 4 at the plant. We first commented on this project in February 2005. At that time, we expressed concern that this project may result in significant adverse impacts upon fisheries resources in Lake Anna and the North Anna River. The impacts could result from fish impingement/entrainment at the intake and the increased frequency of drought flows downstream. Because of these concerns, we indicated that the project would be inconsistent with the Fisheries Management enforceable policy of the Virginia Coastal Resources Management Program. In late October 2005, Dominion announced that it had devised a new method of cooling Unit 3. The proposed Unit 3 will now utilize a combination wet/dry cooling process instead of once through cooling. The purpose of the modification is to lessen the evaporative loss from Unit 3. The proposed Unit 4 would remain a dry cooling unit. We understand that the Unit 3 circulating water system would operate in either of two operating modes:

- Energy Conservation (EC). In this mode, the dry cooling process would be turned off, with reliance on wet towers for heat removal.
- Maximum Water Conservation (MWC). In this mode, a minimum of 1/3 of the heat would be removed by the dry towers. The remainder would be removed, as required, by the wet towers.

In the following sections are our comments on the revised design related to resources under our jurisdiction and our recommendations for mitigating potential adverse impacts upon these resources.

Striped Bass Reservoir Habitat

With the proposed wet/dry cooling system for Unit 3, heated water in the lake will not be increased, as the heat is dissipated through the cooling towers with only a minimal amount returned to the lake. Therefore, we do not expect changes in striped bass habitat with the proposed Unit 3 revision.

Intake systems

The current intake screen at the plant has a 9.5 mm mesh size and an intake velocity of 0.7 feet per second (fps). The same design is proposed for the Unit 3 intake structure. With the redesign of Unit 3's cooling process the expected number of fish impinged by Unit 3 would be reduced from approximately 240,000 to 5,400 annually. The number of fish entrained by Unit 3 would be reduced from 147 million to 3.4 million annually. Our earlier recommendations were for a 1-mm mesh size screen and intake velocity of 0.25 fps. During several meetings with the Nuclear Regulatory Commission (NRC) and Dominion, there was discussion regarding the lack of sweeping velocity in a reservoir situation. Based upon these discussions we reviewed the literature for fish screen recommendations. The most liberal recommendations encountered were for a 2-mm mesh size and 0.5-fps intake. The proposed 9.5 mm screen will only exclude fish larger than 3.4 inches from the intake. By utilizing a 2 mm screen, fish larger than 1 inch will be excluded. Therefore, to increase resource protection, we recommend a 2-mm mesh size and 0.5-fps intake velocity for the new Unit 3 and Unit 4.

Hydrologic Alterations

Some issues of concern still exist regarding the increased evaporation from the lake and subsequent impacts upon downstream hydrology due to Unit 3. We recommend that these concerns be addressed by changing the proposed operating rules for implementation of the MWC mode cooling process. We feel that implementation of these recommendations will result in this project being consistent with the Fisheries Management enforceable policy of the Virginia Coastal Resources Management Program. Our concerns are that the increased frequency of flows below 40 cfs will cause the downstream hydrology to change to a drier condition than

would occur naturally, thereby resulting in lower flows on downstream resources in the Pamunkey River. The required release flow of 40 cfs is 11.6% of mean annual flow. Normal summer flows on a stream this size would be from 70 to 100 cfs or 20-30% of mean annual flow. Reduced flows result in reduced summer habitat for resident species as well as downstream migratory species. An analysis of Dominion's long term North Anna River monitoring data demonstrated that the fish community requires a diverse flow pattern, with different species doing best in wet years. This is similar to study results from the James River and the North Fork Shenandoah River.

Frequency of 20 cfs flows

Normal water elevation of the lake is 250 feet above mean sea level (msl). Current operating rules for the power plant allow the flows to be reduced from a required 40 cfs to 20 cfs whenever the lake elevation reaches 248 ft msl. Prior to lake construction, flows were less than 20 cfs 4.2% of the time. Currently, flows are decreased to 20 cfs an average of 5.2% of the time. With the proposed Unit 3 wet/dry cooling system, the frequency and duration of these 20-cfs events would increase to 7.3% of the time. This is an improvement from the original proposal, which would have resulted in flows being reduced to 20 cfs 11.8% of the time. With the existing two units, there are two 20-cfs flow events predicted over a 24-year period. The proposed Unit 3 would increase that to five 20-cfs flow events over a 24-year period. With a third unit, the duration of the first two events is increased by an additional 4 to 5 weeks. The three additional events have durations of two to thirteen weeks. We feel that a solution exists to reduce the frequency and duration of 20-cfs events. For each additional inch of water stored, an additional 27 days are provided during which flows can be maintained at 40 cfs. By storing three inches of water, resulting in a lake elevation of 250.25 ft msl, the five 20-cfs events are reduced to three events and the duration of the third event is reduced from 13 weeks to one week. The other two events would have the same duration as they previously did. Therefore, we recommend that the normal operating elevation be seasonally (April-November) increased to 250.25 ft msl in order to minimize the impacts of an increased frequency and duration of 20-cfs flows on downstream resources. Rules could be in place to reduce the pool to elevation 250 prior to predicted severe storm events such as hurricanes and tropical depressions.

Altered flow regime above 40 cfs.

The proposed Unit 3 will withdraw a maximum of 49.6 cfs, with an average use of 34.3 cfs. Return water could range from near 0 to 49.6 cfs depending upon the operation of the dry cooling unit and ambient air temperature. Under summer conditions, dry tower return rates could be in the range of 25%. Winter returns could be 100% with minimal evaporative loss from the lake. Use of only the wet tower will result in almost 100% evaporative water loss. We believe that impacts will occur upon the fishery depending upon season and flows. These impacts can be minimized by use of the dry tower to reduce consumptive water loss. Table 1 (attached) summarizes the flows of the North Anna River under four conditions: 1) prior to construction of Lake Anna, 2) under current conditions, 3) with the addition of Unit 3 as proposed, and 4) with the MWC mode utilized. Some discrepancies occur in the table due to the fact that Unit 3 values were computed using weekly averages instead of daily values. This is particularly apparent in the spring months during median (50th percentile) and 75th percentile events, when flows with Unit 3 are shown as being higher than existing values.

In developing our recommendations, we recognize that the creation of Lake Anna has improved water quality downstream from Contrary Creek, which has benefited several fishery resources. During dry conditions in late summer (10th percentile), some flows now are slightly higher than before (Table 1). However, during the majority of time since creation of the lake and operation of the power plant, there has been a negative impact on flows. Almost all monthly percentile flows are now less due to natural and accelerated water evaporation (Table 1). In managing an aquatic resource, low, normal, and high flows are important for various species. Naturally variable flows result in a balanced and diversified fish community. Changes in flow of more than 10% can produce habitat changes of 10%. We have highlighted in Table 1 those instances where, 1) natural flows have been reduced by more than 10% of the pre-lake flows, and 2) where use of the MWC mode would increase post Unit 3 flows by more than 10%. Use of the dry cooling system in the summer also can be effective in helping create seasonal variation during wetter years.

Some of the biologically important fishery resources and most critical seasons are as follows:

- Herring spawning during March. Based upon results on the Rappahannock and James rivers, herring runs are strongest when flows are near normal. Low flows have resulted in reduced numbers moving upstream.
- Shad spawning during late March/April. Upstream migration is less during dry years.
- Smallmouth bass spawning in May/June and juvenile bass development/survival during June. Statewide, we have documented that juvenile bass survival is highest when June flows are between the median and average values. June flows, from Table 1, are currently below median values and would decrease more with the addition of Unit 3 to 43% of pre-lake values. Water conservation during this period should enhance smallmouth bass juvenile survival.
- Juvenile shad survival on the Pamunkey River is best during wet summers. The Pamunkey system has the healthiest shad population in Virginia and serves as the brood source for shad reestablishment in the James River system. We have reviewed the impacts of stream flow on American shad juvenile production in the Pamunkey River. These data were presented to Dominion and the NRC in separate meetings in spring 2006. Shad juvenile year class strength and survival were assessed by evaluating catch-per-unit effort of returning brood stock, ages 4 to 6 years. In summary, the best juvenile shad survival occurred during wetter June-August years (those with the flows at the 80th percentile). Lake Anna is about 1/3 the drainage area of the Pamunkey River at the gage station near Hanover, and is an important contributor to that river's flow. Flow losses within Lake Anna due to evaporation can have a significant impact upon downstream shad resources.

To address our concerns, we recommend the following operating rules for implementation of the Maximum Water Conservation (MWC) mode:

- In March and April, we recommend implementation of the MWC mode when flows are less than 225 cfs. Flows are in the lower quartile, and water conservation savings can result in significant habitat savings and return flows to near existing conditions. These flows are particularly important for herring, shad, migratory striped bass, and resident

sucker and minnow spawning.

- In May, we recommend implementation of the MWC mode when flows are less than 175 cfs. These flows are important for smallmouth bass nesting. The addition of Unit 3 would reduce flows by 30% from pre-lake conditions.
- In June, we recommend implementation of the MWC mode when flows are less than 120 cfs. This value is close to the average value and will enhance smallmouth bass spawning success and subsequent catch to anglers.
- From July - October we recommend implementation of the MWC mode when flows are less than 90 cfs. High flows are important for the habitat requirements of resident fish species that do best in wet years. Without water conservation in wet years, those optimal habitat conditions are not achieved. Wet years also are important for producing strong year classes of American shad in the Pamunkey River.

Under the current proposal, the MWC mode would be implemented after a 7-day waiting period when water surface elevation is below 250 msl and releases are 40 cfs. We recommend against the 7-day waiting period before implementing water conservation. We recommend implementation when downstream flows have a three-day rolling average at the above triggers.

Other Wildlife Resources

In addition to our concerns regarding potential adverse impacts upon fishery resources, we have notified Dominion and the NRC of the existence of at least two new bald eagle nests at Lake Anna. We understand that the NRC may informally consult with the U. S. Fish and Wildlife Service regarding these two nests. We support this consultation and also recommend that Dominion contact DGIF biologist Jeff Cooper (540-899-4169; Jeff.Cooper@dgif.virginia.gov) to address potential adverse impacts upon bald eagles due to this project.

Thank you for the opportunity to provide comments on this project. Please contact Andrew Zadnik at 804-367-2733 if we can be of further assistance.

Sincerely,

Raymond T. Fernald, Manager
Nongame and Environmental Programs

Table 1. Flows (cfs) downstream of Lake Anna based upon pre-lake conditions, existing operations, with the addition of Unit 3 under proposed operation, and with Unit 3 under implementation of the Maximum Water Conservation (MWC) cooling mode.

	Percentile															
	10%				25%				50%				75%			
Months	Pre-lake	Current	Unit 3	MWC	Pre-lake	Current	Unit 3	MWC	Pre-lake	Current	Unit 3	MWC	Pre-lake	Current	Unit 3	MWC
March	195	107	106	105	223	199	173	198	312	241	~~455~~	~~479~~	400	367	~~687~~	~~712~~
April	157	46	46	45	214	146	119	143	293	204	~~271~~	~~297~~	388	362	~~442~~	~~446~~
May	110	40	40	40	139	76	53	66	176	163	123	141	261	250	~~288~~	~~301~~
June	70	40	40	40	81	40	40	40	106	57	46	47	149	121	80	93
July	36	40	40	40	50	40	40	40	76	53	40	40	108	66	40	42
August	15	40	30	40	42	40	40	40	67	52	40	40	102	60	43	54
September	12	40	30	30	25	40	40	40	47	47	40	40	95	56	40	40
October	20	40	21	21	40	40	40	40	72	50	40	40	95	59	58	61

The highlighted cells show flow values where, 1) natural flows have been reduced by more than 10% of the pre-lake flows, and 2) where use of the MWC mode would increase post Unit 3 flows by more than 10%.
The values with a line drawn through are not logical, since post project values are higher than pre-lake values. This is because the analysis technique used weekly averages instead of daily values.